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Nature's Garden Grows 25,000 Wild Flowers

TRAINED SINCE THEY WERE TODDLERS, These Graceful Balinese Enact Island Legends with Quick, Angular Movements of the *Legong*, Popular Indonesian Dance

W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF

Working together challenges all. In Borneo's rich oil fields, Indonesians cooperate with Dutch, Eurasians, and Chinese—some of them enemies in recent uprisings. Together they restored installations left in complete wreckage by retreating Japanese and now produce enough petroleum to boost the country's oil income to $60,000,000 a year.

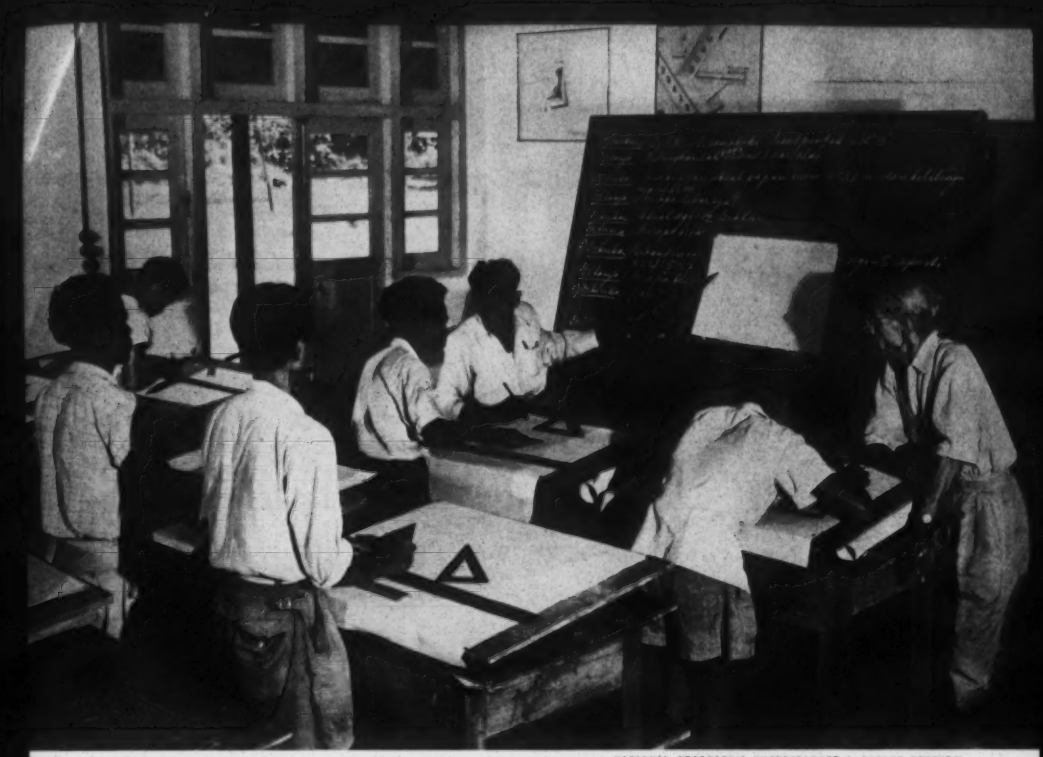
They produce rubber, coal, and pepper in Kalimantan, the Indonesian part of Borneo. Westward across the Java Sea, fertile Sumatra—"Isle of Hope"—abounds in coal, rubber, tea, coffee, tobacco, and water power—and most important, seemingly limitless oil reserves. Sumatra's elephants sometimes rip up oil lines laid above ground or break off telephone poles which they use for back scratchers.

More than three times the size of neighboring Java, with only a quarter of its population, Sumatra beckons Indonesia's crowded populace. For example, more than two and a half million throng Java's metropolis of Djakarta (formerly Batavia), Indonesia's capital. At least two families share most homes. Peddlers trot through streets of tree-shaded bungalows, balancing wares on bamboo poles. From door to door, they offer meat, bean curd, fish, eggs, vegetables, pots and pans, furniture, batik, soft drinks, toys, and between-meal snacks. Djakarta housewives wash clothes, vegetables, youngsters in city canals.

From Djakarta to Surabaja on Java's east coast, rice paddies sparkle on plains and terraced slopes. Improved seed developed by United States

Village Craftsmen Turn Bangka Island Tin into Shiny Export Items Bright as Silver

NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS



NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS

YOUTHFUL INDONESIA WANTS TO LEARN—In Technical Classrooms Students Learn Engineering, Agronomy, Electricity to Fill Needs of Their Struggling Republic

Gotong-rojong Keeps Indonesia Going

A young nation of about 79,000,000 freedom-loving persons scattered on more than 3,000 islands and speaking some 40 tongues needs strong cement to hold it together. Indonesia has found such a unifying force in its own version of the Golden Rule: *gotong-rojong.*

By "helping each to help the other," islanders as far apart as America's Atlantic and Pacific coasts and with little more in common than a New York cab driver and an Eskimo are forging a nation that after five short years commands the world's respect.

Gotong-rojong is most noticeable in the schools. Singing boys and girls gather to pass building stones from hand to hand, helping construct the very buildings in which they will learn the three R's. The number of primary schools has increased from 18,000 in 1940 to 32,000 now; a mere 144 prewar high schools have burgeoned into 2,700.

By "sharing a shortage" of textbooks and equipment, teachers have cut illiteracy in half. Today there are more than 8,000,000 students, four times the number at the end of the Dutch regime. After a decade of Japanese occupation, revolution, and civil war, this sixth-most-populous country, formerly the Netherlands East Indies, turns to education to help solve economic and political problems.

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Everyday Wonders, No. 1

The Lead Pencil

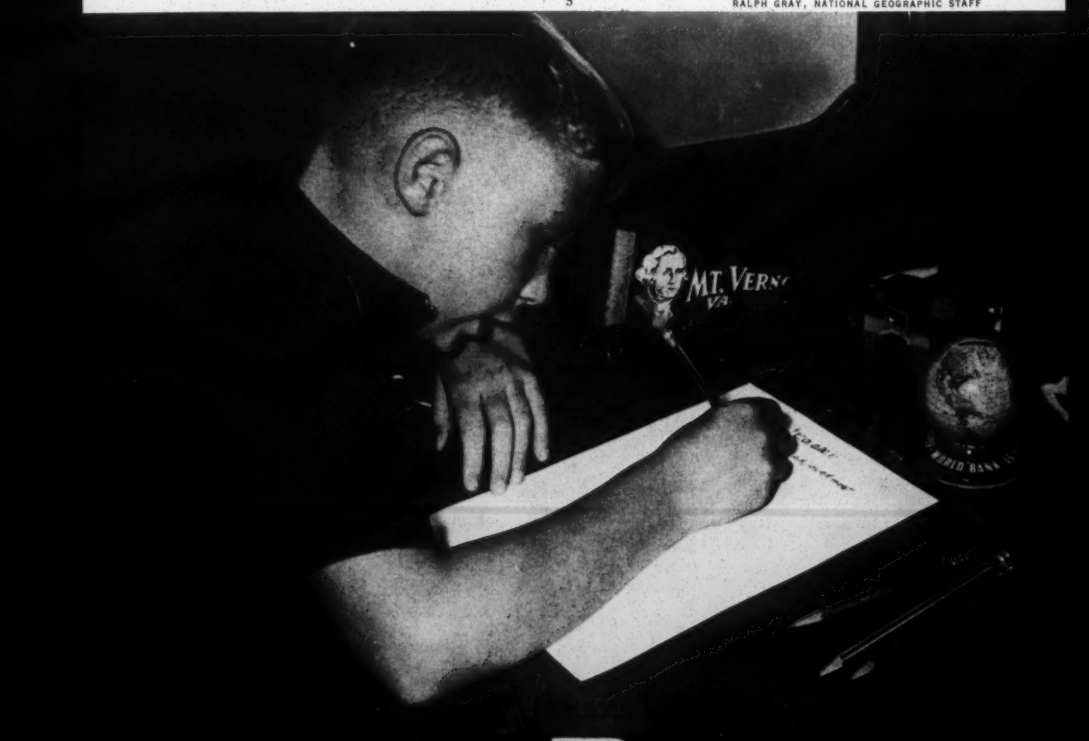
"Dear Teacher: What I enjoyed most about my summer vacation was . . ." And another fourth grader returning to school relives summer experiences in a letter to teacher. Grasping a bright new pencil, he writes his wobbly message unaware that the same instrument was used by Francis Scott Key to set down the first drafts of "The Star-Spangled Banner" and by Abraham Lincoln for his Gettysburg Address.

In these two wartime instances, the pencil was mightier than the pen. And so it is in these days of peace—at least in numbers. For today pencils sell at the rate of nine to one over all other types of writing tools. Americans now buy a record-breaking one and a half billion pencils—just under $50,000,000 worth—or eight and a half per person every year. Laid end to end they would reach some 165,000 miles, far enough to encircle the earth more than six times.

The standard seven-inch model which can write an average 45,000 words is made of more than 25 products from around the globe. It contains

In an age of atomic development, earth satellites, and automation, we stand amazed at miracles being wrought by man's ingenuity. But almost unnoticed beneath our eyes lie commonplace marvels we take for granted—a button, a match, water running from a faucet, the filling station. To tell the fascinating stories behind such everyday wonders, the GEOGRAPHIC SCHOOL BULLETINS *with this issue initiates a new series—beginning with that most ordinary back-to-school item, the pencil.*

RALPH GRAY, NATIONAL GEOGRAPHIC STAFF



NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS

DJAKARTA: CAPITAL AND MOST IMPORTANT HARBOR—Dock Hands Unload One of Nearly 100 Railroad Cars Ordered Since Freedom from The Netherlands

scientists now gives a quarter of Java's farmers 20 to 30 percent more rice.

Soil owes fertility to 300 island volcanoes—more than 50 are still active—which spewed rich ashes, mud, and lava. Families on small farms produce enough pineapples, sweet potatoes, cassava, bananas, breadfruit, avocados, and beans for their own needs and for market, too. Trees yield coconuts, mangoes, oranges, papayas. Harvests come twice, sometimes three times, a year, in a warm, unchanging climate.

Soft breezes rustle through grass-roofed huts on mystical Bali where brown-skinned beauties dance to tinkling Oriental music. Evening winds carry whiffs of roasting goat meat, *saté* sauce, millet cakes, and bananas sizzling in iron bowls of hot coconut oil. Lithe Balinese, like most of their island neighbors, don dazzling sarongs made of bright-colored batik.

North of Bali lies Celebes—renamed Sulawesi. From its chief port of Makassar come graceful praus and modern freighters on circuit voyages that tie Indonesia's scattered islands together. Holds bulge with coffee and copra from Celebes, silverware from Java, rich, rare spices from the Moluccas. These were the Spice Islands that lured Columbus and Magellan. Today they form part of Indonesia, nation in knee pants.

National Geographic References: ***Map***—Southeast Asia (on paper—50¢; fabric—$1)
Magazine—Sept., 1955, "This Young Giant, Indonesia," (school price 55¢)
Jan., 1951, "Republican Indonesia Tries Its Wings," (75¢)
School Bulletins—Oct. 18, 1954, "Everyone Goes to School in Indonesia," (10¢)

EBERHARD FABER PENCIL CO.

PENCILS ARE MADE LIKE SANDWICHES ← Workers or Machines Fit Leads into Grooved Slats, Glued Together and Dried under Pressure. Cut Apart and Sanded, Pencils Get Their Gleaming Lacquer Coats

together in pairs with glue, and finally sliced lengthwise. Sanded smooth, pencils slide into a painting machine. Automatically one end is trimmed; metal tips and erasers are snapped on. After some 135 separate manufacturing steps, the pencil is ready for market.

Most school-desk pencils contain seven parts of clay to ten of graphite. In others, the more graphite, the blacker or softer the lead. Harder pencils have more clay. Seventeen grades of hardness are made—from softest 6B to superhard 9H for tombstone designers.

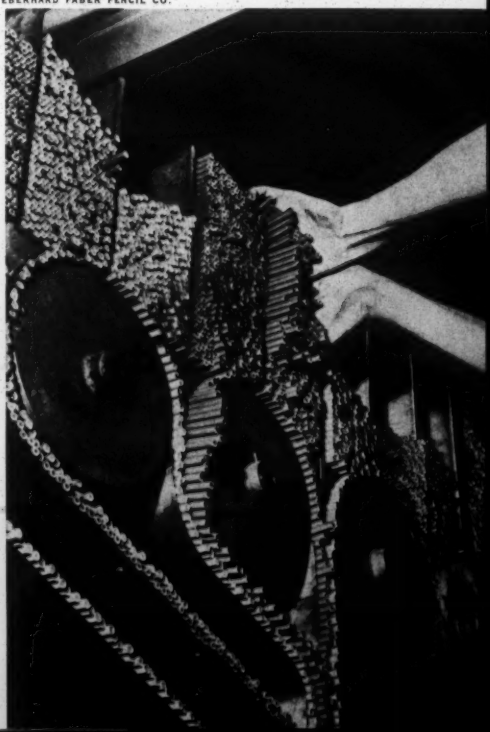
Altogether there are 350 styles and types of pencils. Some write on white-hot steel. Others cut into glass. And still others camouflage furniture nicks and scratches. Some types write distinctly on cellophane, plastics, porcelain, cutlery, and movie film.

Surgeons map out operation areas with special skin pencils, while chemists mark their glassware with wax pencils that melt at 300°. Women use one type on their eyebrows and various others for writing on children's boots, jelly glasses, and freezer food packages.

Heaviest consumers are industrial concerns led by the Bell Telephone Company, followed by school children and government employees.

Since the average yellow pencil—yellow is preferred four to one—can draw a line at least 35 miles long, the year's crop of all pencils in the United States can trace the distance to the moon and back 100,000 times.

EBERHARD FABER PENCIL CO.



OFF TO MARKET—Finished Pencils, Complete with Their Maker's Gold Imprint and Eraser, Drop from Machines into Boxes, Ready for Shipment and Classroom

UMI

LEAD PENCIL MANUFACTURERS ASSOCIATION, INC.

PENCIL STARTS "UNDER PRESSURE" —Tremendous Force Squeezes Puttylike Clay and Graphite into Coiling Pencil Lead, Later Cut to Proper Lengths and Hardened in Intense Heat of Huge Ovens

wax from Brazil, clay from Bavaria, gum from Iran, zinc from New Jersey, graphite from Mexico and Ceylon, rubber from Malaya, sperm whale oil from the South Pacific, and gold leaf from South Africa for the manufacturer's name.

Tennessee supplied most of the wood until its stands of red cedar were exhausted. Then southern buyers bought up cabins made of cedar logs, replaced old cedar-rail fences with wire, for no other wood seemed satisfactory. But now the casings come from incense cedars in California and Oregon. Dyed a rosy pink to simulate red cedar, incense cedar offers all the advantages of the original Tennessee product. Straight-grained, it whittles easily. It also smells like pencils, an important selling point. The average tree yields about 172,000 pencils.

The so-called lead of a pencil is actually graphite. Greeks, Romans, and Egyptians used disks of real lead for ruling lines on papyrus, and 14th-century artists made fine line drawings with lead. But since 1554 lead has been associated with writing in name only.

In that year a graphite deposit was discovered at Borrowdale, England, and the ore was named plumbago, meaning "that which acts like lead." First it was used for marking sheep; then it became a universal writing material. So valuable was it that Parliament put the mine under armed guard. The graphite had only to be sawed into sticks to be used as it was. England prohibited its export and held a world monopoly on graphite for two centuries.

When England's supply gave out, the problem was to find a way to use powdered graphite. In 1795, a Frenchman, Nicolas Jacques Conté, mixed such graphite with powdered clay and fired the mixture in a kiln. Result: the modern pencil.

Pencil manufacturing today is still based on Conté's old process, but modern techniques have been added. Heavy pressure forces a doughy mixture of clay and graphite through steel cylinders equipped with sapphire and diamond dies. It curls from the machine in a spaghettilike coil. Skilled workmen straighten, then cut the still-soft lead to needed lengths. Baked in ovens in 2,000-degree heat, leads emerge tempered and tough, ready for their wooden cases.

Seasoned wood is cut into seven-inch slats, six to seven pencils wide and a half-pencil thick. The slats are grooved and leaded, then sandwiched

Rio's business is also government. The Senate meets in Monroe Palace (left), named for the fifth President of the United States and transported from St. Louis, Missouri, where it housed Brazil's display at the 1904 Exposition. The waving mosaic sidewalk stretching before it sometimes brings on seasickness in pedestrians.

Sprawling along narrow valleys between steep hills, bounded on two sides by salt water, Rio's beauty awes tourists and stirs its citizens. Cariocas climb their hills at night to see the "Necklace of Pearls," lights encircling Botafogo Bay. They jam their gleaming beaches and scrimp to live in the tower apartments that line Copacabana (below).

Rio de Janeiro's name is misleading. In 1502, explorers, believed to be part of Amerigo Vespucci's fleet, mistook sweeping Guanabara Bay for the mouth of a broad stream and named it for the month of their discovery—"River of January." But Cariocas have a nickname for their home which rings true: *Cidade Marvilhosa*, "Marvelous City." *The National Geographic Magazine* of March, 1955, captures Rio's marvels with 40 pages of color and text.

"Marvelous City" Is the Name for Rio

Illustrations by Charles Allmon, National Geographic Staff

A bullet-shaped, 1,296-foot mountain stands like a sentry at the jaws of one of the world's most beautiful harbors. Facing it, on an inland peak, men have carved a 130-foot statue of the Saviour. These two guardians, Sugar Loaf Mountain and the Christ of Corcovado, mark Rio de Janeiro as surely as the Eiffel Tower signifies Paris. Below them, on traffic-snarled streets lined by gleaming skyscrapers, over two and a half million "Cariocas" keep a busy pulse beating in this capital city of the fourth-largest country in the world—Brazil.

Gleaming new metallurgical works and oil refineries sparkle in the city's sunshine beside tiny industries where the owner lives upstairs and has perhaps five helpers.

Five thousand ships a year help feed Rio's mushrooming industries with oil, machinery, vehicles. In return, they pick up cargoes of coffee, raw cotton, cocoa, and other exports. Santos Dumont Airport handles about 200 landings and take-offs a day. But under the bustle of Rio's surface is a bubbling spirit of frolic which boils over annually at carnival time (right). For four days costumed marchers parade with floats. Gourds rattle as samba dancers snake through gay crowds.

A. AUBREY BODINE, BALTIMORE SUN

GOLD-PETALED BLACK-EYED SUSANS—Maryland's State Flower Ranges Far, Dapples Midwest Prairies and New England Hills

Nature's Garden Grows 25,000 Wild Flowers

Every American who has ever taken a drive into the country must have wondered at the wide variety of wild flowers that greeted him. They paint roadside meadows in colors brilliant or pastel. They peek from tangled woodlands, glow from stagnant marshes, and even thrust blossoms through the dust and gravel of highway ditches. Fall has its wild flowers as well as spring. Goldenrod, beautiful bane of hay-fever sufferers, flames yellow in sunny pastures. Banks of Spanish blossom smother midwest fields—a sight to stop a Sunday driver.

Friends to all, American wild flowers are apt to be well known by only a few. Twenty-five thousand species of them add a touch of beauty to nature's half acres throughout the United States. Just to list the names of all species would more than fill the entire text space of an issue of *The National Geographic Magazine.*

The devotee who studies and tracks down America's wild flowers is in for some surprises. He will find orchids growing in the rugged State of Maine—half-inch-long flowers, pink with a white lip spotted with purple. He will see white Spanish bayonet dotting North Carolina's coastal fields, within five miles of the Atlantic. He will notice sundew thriving in roadside gullies, lifting its red tentacles which gleam with syrupy fluid. When insects alight for a taste, their feet are trapped by the sticky discharge. Inexorably the surrounding hairlike petals bend over and snare the victim.

Wild flowers bloom on wind-swept mountain peaks, on parched deserts, and in the depths of great cities. Mountain rosebay gleams pinkly from the crest of Roan Mountain, astride the North Carolina–Tennessee boundary. It covers about 500 acres of the summit. Prickly pear cactus, sprouting in arid regions of the southwest, blooms with orange-yellow flowers. This is but one of the many cacti with flowers of

COMMON ANCESTOR—Prize-Winning Hothouse Roses of Varying Hues All Spring from the Wild Rose

M. WOODBRIDGE WILLIAMS, NATIONAL GEOGRAPHIC STAFF

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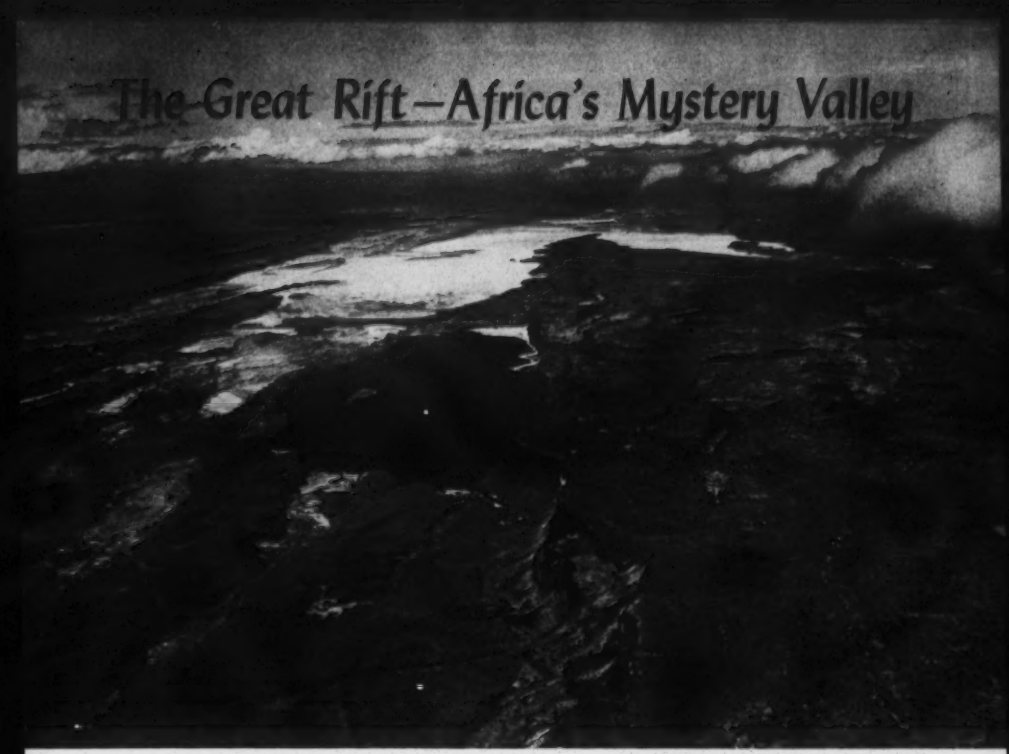
The Great Rift—Africa's Mystery Valley



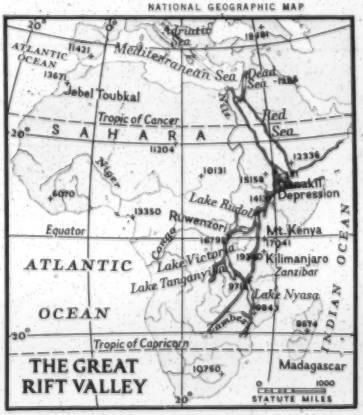
W. ROBERT MOORE, NATIONAL GEOGRAPHIC STAFF

No aerial photograph could cover all the Great Rift Valley nor penetrate its many mysteries. For the gigantic wrinkle on Mother Earth's face stretches 4,000 miles—from Syria to below Africa's Zambezi River. But the picture above shows one clearly defined section, a wide, steep-walled depression dappled by a Kenya lake. This irregular trench down Africa's east side is a monument to the dim age, millions of years ago, when the surface of our young planet was shifting and splitting as it cooled. Earth's crust sagged between a series of roughly parallel fractures—and the Great Rift was born.

It starts north of the Dead Sea, though one arm reaches northward into the Adriatic. The Red Sea fills it, the Suez Canal meets one extension, the Gulf of Aden joins it. In Ethiopia it is a 50-mile-wide gash. In parts of Kenya and Tanganyika its sheer walls slice past Africa's mightiest peaks—mist-shrouded volcanic cones which the crack itself produced. Its western branch is rimmed by the fabled Ruwenzori, Mountains of the Moon where ancients placed the Nile's source—with surprising accuracy. This Western Rift links the largest lake group outside North America. The lakes lie along it like puddles in a rut.

The Great Rift Valley rises and falls with the terrain. Often it fades to a mysterious, indistinct scar through jungle-matted hills, or is lost in volcanic lava that once spewed from its depths. Yet in Albert National Park on the Western Rift, wild animals are hemmed in by its towering escarpment and roam up and down its floor.

NATIONAL GEOGRAPHIC MAP



NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS

THREE TEXAS BLOSSOMS IN A FIELD OF BLUEBONNETS—Like Nearly 40 Percent of Texas Wild Flowers, This Lush Purplish Lupine Is Native to No Other State

every color range. Some desert plants lie dormant for as long as seven years until a heavy rainfall brings a riot of bright blossoms. Wild flowers offer a taste of the countryside to city parks like Washington's Rock Creek Park, where many-hued violets, trout lily named for its spotted leaves, trailing arbutus, and other species brave the fumes of traffic and the proximity of bustling streets. Trailing arbutus, incidentally, was named Mayflower by the Pilgrim fathers—not for the ship that brought them to Plymouth, but for the month the delicate, purple-tinged blossoms appear. It is the State flower of Massachusetts.

Many other State legislatures have adopted State flowers. Texas boasts of its much-sung bluebonnet which often turns whole acres of pastureland a rich purple. Montana claims bitterroot and has named a mountain range for it. Bitterroot's botanical name, *Lewisia rediviva*, honors one of the exploring team of Lewis and Clark who probed the northwest 150 years ago.

Limitless entertainment awaits the wild-flower enthusiast—and some excitement, too. One expert, author of "American Wild Flower Odyssey" in the May, 1953, *National Geographic Magazine*, has been photographing wild flowers for 60 years. He tells of being treed by an angry bull in Montana, of dodging water moccasins in Georgia's Okefinokee Swamp. Anyone, expert or not, can savor the thrill of breasting a hilltop and wading through a golden carpet of black-eyed Susans. To any flower lover there is heartstopping adventure in discovering a tall columbine heavy with red flowers, deep in a wooded dell.